Stormwater pond ecology

Ecological function within the landscape

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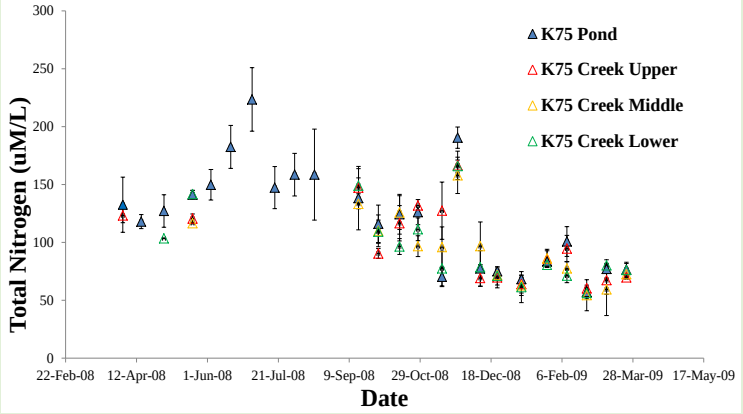
Ponds as ecosystems

- Whether or not they are engineered or designed to be, they are ecosystems
  - Wildlife habitat, nutrient uptake/cycling
- Pond management can strive to minimize or maximize this function
  - Aquatic herbicides vs. un-mowed buffers
- Ponds also interact with upstream and downstream landscapes

- In SC, ponds represent a unique ecosystem that was not previously part of our landscape
  - Low flushing capacity/high residence time

Physical and chemical environment

Greenfield/SCAEL



- Receive water and its associated load
  - Nutrients, sediment, bacteria, contaminants
- Often exchange with downstream systems/creeks
  - Water quality of ponds often consistent with downstream water quality
- Not all uplands are equal
  - Commercial, golf course, residential
  - Differing management goals, resources, knowledge

Microbiota

- Ponds can support algal blooms, exacerbated by nutrient loading
  - Low dissolved oxygen
  - Harmful algae blooms (HABs)
    - Salinity can give competitive advantage
    - Poor flushing can also lead to eutrophication
  - Filamentous algae
- Ponds can carry high bacterial loads
  - Fecal coliform, enterococcus

Macrophytes

- Submerged, floating, emergent
  - Native (Cattail, smooth cordgrass)
  - Invasive (*Alternanthera*/alligatorweed, *Ludwigia*)
- Ecological roles
  - Buffers, wildlife habitat, nutrient uptake and cycling
- Management roles
  - Control erosion, wildlife (↑↓), aesthetic value

Clemson Extension

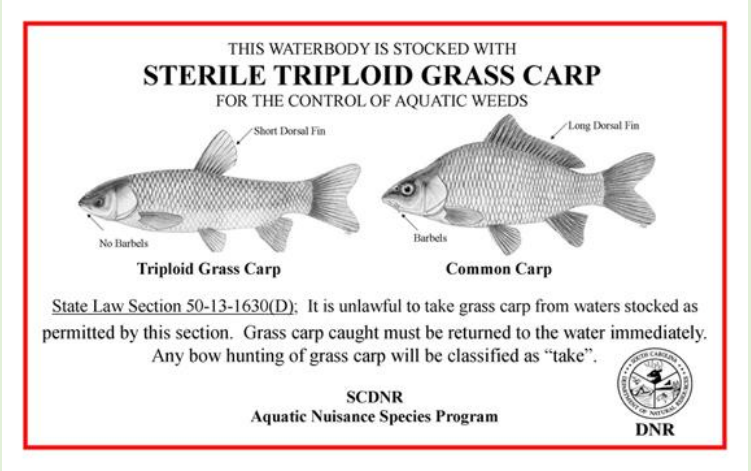
Macrofauna

- Wading birds, waterfowl

Image: Ellen Jennings

- Reptiles

- Fish
  - Sometimes used as management tool (e.g., triploid grass carp or tilapia for vegetation control)



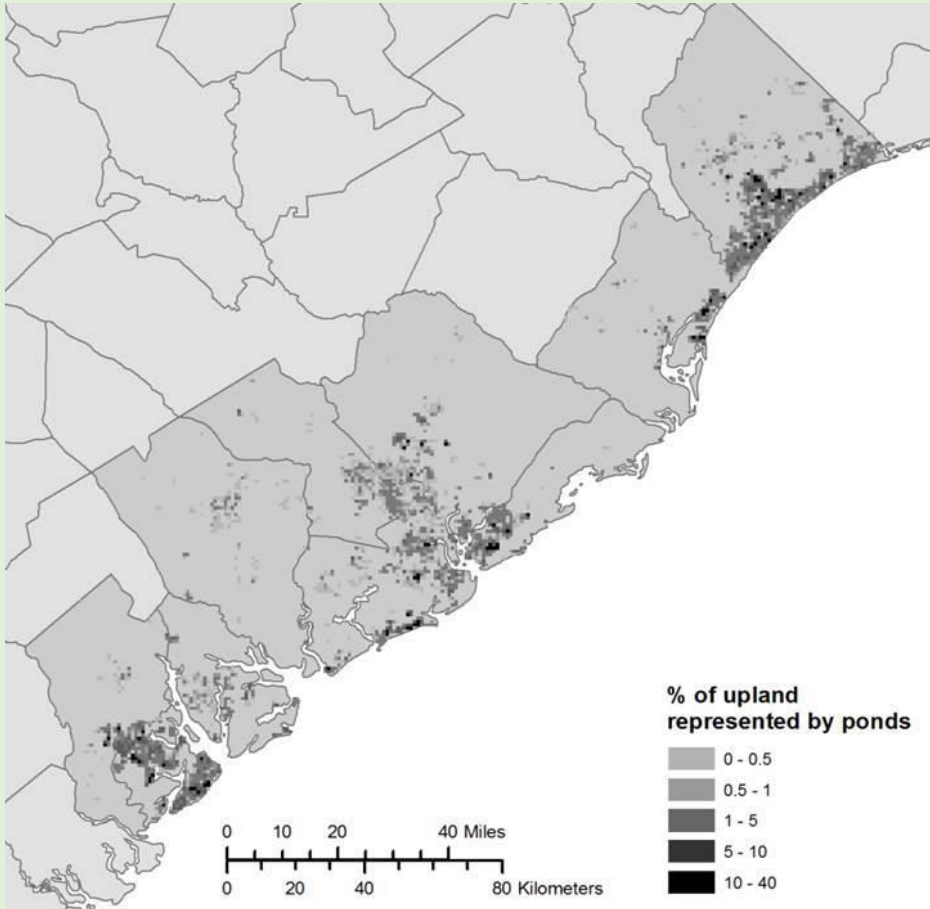
Exotic and invasive species

- May be introduced
  - E.g., triploid grass carp or tilapia for vegetation control

- May be semi-accidental
  - Aquarium releases
    - Island apple snail
    - Goldfish
    - Water milfoil, *Hydrilla*
  - Unexpected proliferation
    - Water hyacinth

In the landscape

- As of 2013 there were 21,594 ponds in the 8 coastal counties
- 9,269 of these were associated with development
- Significant addition of surface water in our landscape
- Mostly small (<0.54 acres), near urban centers, residential, <1 mi to a river or tidal creek



In the landscape

- Ponds are low-lying and often outfall to estuarine habitats. Majority in Critical Zone.

- Sea level rise will increase seawater exchange, altering chemical and biological processes within ponds